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Revision 0

Second Quarter FY 2001 Operations Report for Test Area North Final Groundwater Remediation Operable Unit 1-07B

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Idaho National Engineering and Environmental Laboratory
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Second Quarter FY 2001 Operations Report for Test Area North Final Groundwater Remediation Operable Unit 1-07B

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Assistant Secretary or Office of Environmental Management
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ABSTRACT

This report has been prepared to meet the operational reporting requirements of Section 4.2 of the *Remedial Action Work Plan Test Area North Final Groundwater Remediation—Phase B Operable Unit 1-07B.* The reporting period is January 1 through March 31, 2001. This report provides a summary of treatment system operations and other field activities that occurred during the second quarter of Fiscal Year 2001. The Operable Unit 1-07B remedial action field activities include construction and maintenance, in situ bioremediation pre-design operations (including sampling and facility operations), groundwater monitoring, and waste management.

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TABLES

ACRONYMS

ASTU	Air Stripper Treatment Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSWA	CERCLA Storage Waste Area
DOE-ID	Department of Energy Idaho Operations Office
FY	fiscal year
GC/FID	Gas Chromatography/Flame Ionization Detector
GWTF	Groundwater Treatment Facility
INEEL	Idaho National Engineering and Environmental Laboratory
ISB	in situ bioremediation
NPTF	New Pump and Treat Facility
OU	operable unit
PDO	pre design operation
PPE	personal protective equipment
SPME	Solid Phase Micro Extractor
TAN	Test Area North
TSF	Technical Support Facility

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1. INTRODUCTION

This report has been prepared to meet the operational reporting requirements of Section 4.2 of the *Remedial Action Work Plan Test Area North Final Groundwater Remediation—Phase B Operable Unit 1-07B* (DOE-ID 1999). The reporting period for this report is January 1 through March 31, 2001. This report provides a summary of treatment system operations and other field activities that occurred during the second quarter of Fiscal Year (FY) 2001. The Operable Unit (OU) 1-07B remedial action field activities included:

- In situ bioremediation (ISB) pre-design operations (PDOs) (including sampling and facility operations)
- New Pump and Treat Facility (NPTF) construction
- Groundwater monitoring
- Waste management.

This report provides the highlight of these field tasks; identifies any significant events, problems, or concerns. In addition, this report includes the quantity of water processed, the source of the water, and the operational uptime for the Air Stripper Treatment Unit (ASTU). Finally, this report provides a waste inventory summary and any changes to the status of the CERCLA Waste Storage Area (CSWA) waste inventory.

2. FIELD ACTIVITIES AND HOT SPOT TREATMENT SYSTEM OPERATIONS

This section is a summary of field activities and hot spot treatment facility operations that include significant events, problems and/or concerns, the source and quantity of water processed through the treatment facilities, and associated operational uptime.

2.1 Field Activities and Hot Spot Treatment System Operations and Significant Events

2.1.1 Groundwater Treatment Facility

The Groundwater Treatment Facility (GWTF) remained in a standby condition throughout this performance period. Periodic operation of the GWTF was performed, as necessary, to maintain process equipment and store purge water. Purge water from well Test Area North (TAN)-25 ISB sampling activities was placed in the GWTF Surge Tank T-1.

2.1.2 Air Stripper Treatment Unit

Because of an unintentional outage on the ASTU circuit on December 24, 2000, when the TAN-29 extraction pump failed, the ASTU remained in a secure condition throughout this quarter. An attempt was made to restart the ASTU during the week of January 8, 2001; however, the breaker for TAN-29 tripped. It was then determined that the TAN-29 pump was no longer connected to its discharge pipe and maintenance will be performed next quarter. Other ASTU activities included:

- Vertical profile purge water from ISB sampling was processed through the ASTU during this period.
- Instrument calibrations performed during the week of January 1, 2001.

2.1.3 New Pump and Treat Facility

Construction of the NPTF continued during the weeks of January 1, 2001 through January 14, 2001. System operation testing of the NPTF began during the week of January 29, 2001 and was completed during the week of February 26, 2001. A management self-assessment was performed during the weeks of February 26, 2001 through March 12, 2001.

2.1.4 ISB Field Evaluation

2.1.4.1 Nutrient Injection System—The sodium lactate injection strategy used during the second quarter included injecting a 6.0% solution of sodium lactate into Technical Support Facility (TSF)-05 at 40 gallons per minute (gpm) once every 2 months. Each injection was followed by a 2,160-gal potable water flush. Sodium lactate was injected on January 10, 2001 and March 7, 2001, per this strategy.

2.1.4.2 ISB Field Sampling—Monthly sampling was performed on January 15, 2001, February 12, 2001, and March 12, 2001 in accordance with the *Sampling and Analysis Plan for Enhanced In Situ Bioremediation Predesign Operations Test Area North, Operable Unit 1-07B* (INEEL 2001).

2.1.5 Groundwater Monitoring Field Activities

Vertical profile sampling was completed during the week of February 26, 2001. The sampling will be resumed later this year.

2.1.6 Other OU 1-07B Field Activities

Well maintenance was performed during the weeks of February 28, 2001 through March 5, 2001. Specific items include the replacement of pump P-40 motor-end and the replacement of TSF-05 pump-end Redi-Flo tube.

The annual and quarterly lockout/tagout audits were performed during the weeks of March 19, 2001 and March 26, 2001.

During this period, the following daily, weekly, and monthly inspections took place in accordance with project procedures, plans, and agreements with the Agencies:

- Daily Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) inspections of the GWTF and ASTU.
- Weekly inspections of eyewashes, first aid kits, and the decontamination trailer.
- Weekly temporary accumulation area inspections.
- Monthly inspections of the ground fault circuit interrupter, fire extinguishers, emergency lights, tank alarms, spill kits, and the decontamination personal protective equipment (PPE) kit.

2.2 Facility Operations

This section covers the source and quantity of water processed at the GWTF and the ASTU.

2.2.1 GWTF Operations

There was no water treated or discharged from the GWTF during this quarter because of the ISB PDOs. However, ISB sampling purge water from wells TAN-25 and TSF-05 was placed into Surge Tank T-1. Table 1 is a summary of all the water that was transferred to the GWTF.

2.2.2 ASTU Operations

The ASTU was in a secure standby condition throughout this quarter.

Purge water from the ISB and vertical profiling sampling activities was processed through the ASTU intermittently throughout the reporting period. Table 2 provides the quantities of the purge water processed through the ASTU during this quarter. A processing summary for the ASTU from November 1998 through March 2001 is provided in Appendix A.

Table 1. Purge water to the GWTF.

From Wells	Date	Volume added to GWTF (gal)
TAN-25	January 15, 2001	30
TSF-05	January 16, 2001	50 (including 10 gal container rinsate)
TAN-25	February 12, 2001	30
TSF-05	February 12, 2001	50 (including 10 gal of container rinsate)
TAN-25	March 12, 2001	30
TSF-05	March 12, 2001	50 (including 10 gal of container rinsate)
Total for the Quarter		240

Table 2. Purge water processed through the ASTU.

Wells/Sources	Date	Volume (gal)
TAN-47, TAN-48 and TAN-52	January 8, 2001	175
TAN-48, TAN-51 and TAN-52	January 9, 2001	213
TAN-48, TAN-51 and TAN-52	January 10, 2001	204
TAN-51, TAN-56, TAN-10A, TAN-27, TAN-37A, TAN-37B and TAN-D2	January 15, 2001	489
TAN-26, TAN-31, TAN-51 and TAN-56	January 16, 2001	281
TAN-51	January 17, 2001	360
TAN-50 and TAN-55	January 22, 2001	249
TAN-50, TAN-54, TAN-55 and TAN-56	January 23, 2001	278
TAN-50, TAN-54, TAN-55 and TAN-56	January 24, 2001	292
TAN-54 and TAN-56	January 25, 2001	163
TAN-50, TAN-54, TAN-55 and TAN-56	February 5, 2001	279
TAN-50, TAN-54, TAN-55 and TAN-56	February 6, 2001	279
TAN-50, TAN-54, TAN-55 and TAN-56	February 12, 2001	266
TAN-50, TAN-54, TAN-55, TAN-56, TAN-28, TAN-30A, TAN-26, TAN-31 and TAN-D2	February 13, 2001	519
TAN-50, TAN-54, TAN-55, TAN-56, TAN-37A, TAN-37B, TAN-10A and TAN-27	February 14, 2001	519
TAN-50, TAN-54 and TAN-55	February 19, 2001	219

Table 2. (Cont'd).

Wells/Sources	Date	Volume (gal)
TAN-50 and TAN-54	February 20, 2001	137
TAN-26, TAN-31, TAN-D2, TAN-28 and TAN-30A	March 12, 2001	438
TAN-37A, TAN-37B, TAN-10A and TAN-27	March 13, 2001	210
Total		5,570

2.3 Operational Uptime

The operational uptime report provides a monthly summary of the operational uptime of facilities that support hot spot containment. If the GWTF is in an operating mode, the operational uptime requirement is 60% at 189 L/min (50 gpm). Conversely, the ASTU has an operational uptime requirement of 80% at 189 L/min (50 gpm). The measure of operational uptime is calculated using Equation (1).

$$\%\, uptime = \left[\frac{Q_{TOT}}{(Time)(50\ gpm)} \right] \tag{1}$$

where

Q_{TOT} = total quantity of water processed (gal)

$Time$ = total time available for processing (minutes)

gpm = gallons per minute.

2.3.1 Monthly Operational Uptime for the GWTF

The GWTF is in standby mode throughout the duration of the ISB PDO.

2.3.2 Monthly Operational Uptime for the ASTU

The ASTU was in a secure condition and only purge water from the ISB and vertical profiling sampling activities was processed through the ASTU intermittently throughout the reporting period. Since the ASTU was not operated continuously, the operational uptime was assumed to be 0%.

3. OPERATIONS ISSUES

The only operational issue for this quarter was with regards to the operation of the ASTU. According to the Agency agreements, the ASTU was allowed to operate through this quarter; based on a letter from Scott Anderson, Idaho Department of Water Resources, to Ms. Kathleen Hain, Manager Environmental Restoration Program, U. S. Department of Energy Idaho Operations Office[a]. The ASTU was also placed in a secure standby mode based on the letter from F. Lee Smith, Director Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, to Ms. Kathleen E. Hain, Manager Environmental Restoration Program[b]. Mr. Smith had requested that the ASTU be placed on standby as long as the NPTF comes on line within 23 months of the ASTU standby. Conservative modeling indicated that all chemical contaminants from the hot spot and medial zone of the TAN contaminant plume would be captured by the NPTF within this time frame.

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a. Scott Anderson, IDWR, to Kathleen Hain, DOE-ID, "Extension for Temporary Use of Remediation Wells for Injection of ISB Treatability Study Amendments and Temporary Use of Injection Well TAN-49 for Injecting Treated Water During Phase B Remediation," January 20, 2000.

b. F. Lee Smith, INEEL, to Kathleen Hain, DOE-ID, "Request to Place the Operable Unit (OU) 1-07B Air Stripper Treatment Unit Operations in Standby," Contract No. DE-AC07-99ID13727, CCN 17445, January 23, 2001.

4. COMPLIANCE MONITORING

The current compliance monitoring requirements for OU 1-07B are for ASTU operations. These requirements include measuring the treated water effluent and air discharges to ensure that these outputs are within the established limits specified in the *Enhanced In Situ Bioremediation Field Evaluation Work Plan, Test Area North, Operable Unit 1-07B* (DOE-ID 1998) and the approved no-longer contained-in determination for the ASTU.

4.1 Compliance Sampling and Analysis

The ASTU remained in a secure condition throughout this quarter. Therefore, the ASTU monthly compliance samples were not taken and analyzed in accordance with the ISB Sampling and Analysis Plan (INEEL 1999, 2001).

4.2 Performance Evaluation Sampling and Analysis

During the second quarter, monthly performance evaluation (PE) samples were analyzed at the INEEL Analytical Laboratory Department at the Idaho Nuclear Technology and Engineering Center (INTEC) and Idaho Research Center (IRC), in accordance with the PE program outlined in the Phase B Remedial Action Work Plan (DOE-ID 1999). A copy of the results for each monthly PE is provided in Appendix B.

4.2.1 January 2001 PE Samples

The January 2001 water samples were reported March 20, 2001. Single blind volatiles mix #1 (lot # 01250102) was analyzed in duplicate with good precision. The results reported for trans-1,2-dichloroethylene, cis-1,2-dichloroethylene, trichloroethylene, and tetrachloroethylene were outside the corresponding action limits and corrective action is required. The PE samples for March 2001 have been analyzed since these results were reported and indicate the most recent laboratory performance.

Single blind volatiles mix #2 (lot # 01250102) and mix #1 (lot # 01250101) were analyzed in duplicate with good precision. The reported results were within the corresponding warning limits.

Single blind volatiles mix #2 (lot # 01250101) was analyzed in duplicate with good precision. The reported results were within the corresponding warning limits, with the exception of 1,1-dichloroethylene which corrective action is required. The PE samples for March 2001 have been analyzed since these results were reported and indicate the most recent laboratory performance.

4.2.2 February 2001 PE Samples

The February 2001 water samples were reported March 20, 2001. Single blind volatiles mix #1 (lot # 02220102) was analyzed in duplicate with good precision. The reported results for vinyl chloride, cis-1,2-dichloroethylene, trichloroethylene, and the original result for tetrachloroethylene were within the corresponding warning limits. The duplicate result for tetrachloroethylene was outside the corresponding warning limits but within the corresponding action limits and corrective action is recommended. The results for 1,1-dichloroethylene and trans-1,2-dichloroethylene were reported as <10 µg/L, per project requirements, and could not be evaluated.

Single blind volatiles mix #2 (lot # 02220102) was analyzed in duplicate with good precision. The reported cis-1,2-dichloroethylene results and the duplicate result for tetrachloroethylene were within the

corresponding warning limits. The original tetrachloroethylene result was outside the corresponding warning limits but within the corresponding action limits and corrective action is recommended. The results for vinyl chloride, trans-1,2-dichloroethylene, 1,1-dichloroethylene, and trichloroethylene were reported as <10 µg/L, per project requirements, and could not be evaluated.

4.2.3 March 2001 PE Samples

The March 2001 water samples were reported April 24, 2001. Single blind volatiles mix #1 (lot # 03200101) was a blank (i.e., purge and trap grade methanol), which was analyzed in duplicate. The analysis results were below the detection limits for the Carboxen Solid Phase Micro Extractor (SPME) combined with gas chromatography/flame ionization detector (GC/FID) employed for the analyses and were reported by the laboratory as nondetects.

Single blind volatiles mix #2 (lot # 03200101) was analyzed in duplicate with good precision. The reported results for cis-1,2-dichloroethylene and trans-1,2-dichloroethylene were within the corresponding warning limits. The reported vinyl chloride and tetrachloroethylene results were outside the corresponding action limits and corrective action is required. The results for 1,1, dichloroethylene and trichloroethylene were reported as <10 µg/L, per project requirements, and could not be evaluated.

5. WASTE INVENTORY SUMMARY

The following waste inventory information summarizes the waste stored in the CWSA during January, February, and March of 2001.

During the second quarter of FY 2001, seven 55-gal drums (i.e., 19161K, 19162K, 19164K, 19165K, 19197K, 19198K, and TAN000254) containing 5-gal carboys of ISB test kit waste (see Category 11 below) were repackaged into three 55-gal drums. This is indicated in Table 3 by showing seven drums removed and three drums generated. Also, the First Quarter FY 2001 report had incorrectly shown that there were six drums "Currently Stored" instead of seven.

The quantity of drums "Currently Stored" in Category 1 was corrected to 17. The first quarter FY 2001 report had incorrectly shown 15.

The "Unit" description in Category 8 has been corrected from the 55-gal drum shown in the First Quarter FY 2001 report to the correct 20-gal drum, as shown below.

Table 3. Second quarter FY 2001 waste inventory.

Category	Waste	Unit	Generated	Currently Stored	Removed	Shipping Date
1	Bag filter, PPE, and miscellaneous	55-gal drum	0	17	0	N/A
2	Spent carbon	55-gal drum	0	0	0	N/A
3	Spent resin	55-gal drum	0	1	0	N/A
4	TAN-31 drill cuttings	2 × 4 × 8-ft box	0	5	0	N/A
5	TAN-37 drill cuttings	2 × 4 × 8-ft box	0	0	0	N/A
6	TAN-37 and TAN-48 drill cuttings	4 × 4 × 8-ft box	0	0	0	N/A
7	GWTF piping and parts	4 × 4 × 8-ft box	0	4	0	N/A
8	Brass material	20-gal drum	0	1	0	N/A
9	Tracer test material	55-gal drum	0	2	0	N/A
10	Bag filter rings	55-gal drum	0	1	0	N/A
11	ISB test kit waste	55-gal drum	3	3	7	N/A
12	Miscellaneous waste	30-gal drum 5-gal drum	0	1 1	0 0	N/A N/A
13	Sampling equipment	55-gal drum	0	1	0	N/A

6. REFERENCES

DOE-ID, September 1998, *Enhanced In Situ Bioremediation Field Evaluation Work Plan, Test Area North, Operable Unit 1-07B*, DOE/ID-10639, Revision 0, U. S. Department of Energy Idaho Operations Office.

DOE-ID, July 1999, *Remedial Action Work Plan Test Area North Final Groundwater Remediation—Phase B Operable Unit 1-07B*, DOE/ID-10629, Revision 0, U. S. Department of Energy Idaho Operations Office.

INEEL, May 1999, *Sampling and Analysis Plan for the Enhanced In Situ Bioremediation Field Evaluation Test Area North, Operable Unit 1-07B*, INEEL/EXT-98-00421, Revision 1, Idaho National Engineering and Environmental Laboratory.

INEEL, May 2001, *Sampling and Analysis Plan for Enhanced In Situ Bioremediation Predesign Operations Test Area North, Operable Unit 1-07B*, Revision 1, Idaho National Engineering and Environmental Laboratory.

Appendix A

OU 1-07B ASTU Processing Summary

Table A-1. OU 1-07B ASTU processing summary.

Date	Flow Totalizer Reading	Quantity of Water From Each Well (gal)			Monthly Operation Uptime (%)[a]	Comments
		TAN-29	Other	Total		
November 16, 1998	0	—	—	—	—	Beginning of Processing
November 30, 1998	1,080,000	1,080,000	—	1,080,000	100	Total of continuous operations and other
January 3, 1999	2,232,000	2,226,206	5,794	2,232,000	91	Other=well purge
QUARTERLY TOTAL		3,306,206	5,794	3,312,000	94	First quarter operational uptime
January 25, 1999	1,480,284	1,480,000	—	1,480,284	93	—
February 22, 1999	1,994,449	1,994,449	—	1,994,449	99	—
March 29, 1999	2,540,850	2,539,136	1,714	2,540,850	101	—
QUARTERLY TOTAL		6,013,869	1,714	6,015,583	98	Second quarter operational uptime
April 26, 1999	2,065,200	2,065,200	—	2,065,200	102	—
May 31, 1999	2,346,100	2,346,100	—	2,346,100	93	—
June 28, 1999	1,970,000	1,957,619	12,381	1,970,000	98	—
QUARTERLY TOTAL		6,368,919	12,381	6,381,300	97	Third quarter operational uptime
July 25, 1999	2,027,800	2,008,024	19,776	2,027,800	104	—
August 29, 1999	2,519,065	2,518,258	807	2,519,065	100	—
October 3, 1999	2,646,600	2,645,690	910	2,646,600	105	—
QUARTERLY TOTAL		7,171,972	21,493	7,193,465	103	Fourth quarter operational uptime
YEAR-TO-DATE TOTAL		22,860,966	41,382	22,902,348	98	Annual Operational Uptime (FY 1999)
October 31, 1999	2,200,000	2,197,607	2,393	2,200,000	109	—
November 30, 1999	2,286,300	2,284,538	1,762	2,286,300	106	—
December 31, 1999	2,236,700	2,235,947	753	2,236,700	100	—
QUARTERLY TOTAL		6,718,092	4,908	6,723,000	105	First quarter operational uptime

Table A-1. (continued).

Date	Flow Totalizer Reading	Quantity of Water From Each Well (gal)			Monthly Operation Uptime (%)[a]	Comments
		TAN-29	Other	Total		
February 1, 2000	2,110,300	2,109,306	994	2,110,300	95	—
March 1, 2000	2,016,500	2,015,691	809	2,016,500	97	—
April 1, 2000	2,307,600	2,306,629	971	2,307,600	103	—
QUARTERLY TOTAL		6,431,626	2,774	6,434,400	98	Second quarter operation uptime
May 1, 2000	2,257,143	2,250,284	6,859	2,257,143	104	—
May 30, 2000	2,195,000	2,194,071	929	2,195,000	105	—
June 26, 2000	1,953,120	1,937,040	16,080	1,953,120	100	—
QUARTERLY TOTAL		6,381,395	23,868	6,405,263	103	Third quarter operation uptime
July 24, 2000	2,142,100	2,125,168	16,932	2,142,100	106	—
August 27, 2000	2,597,865	2,571,761	26,104	2,597,865	106	—
October 1, 2000	2,560,265	2,559,937	328	2,560,265	102	—
QUARTERLY TOTAL		7,256,866	43,364	7,300,230	105	Fourth quarter operation uptime
YEAR-TO-DATE TOTAL		26,787,979	74,914	26,862,893	103	Annual Operational Uptime (FY 2000)
October 29, 2000	1,678,300	1,677,729	571	1,678,300	83	—
November 26, 2000	2,113,000	2,110,997	2,003	2,113,000	105	—
December 13, 2000	2,025,785	2,023,378	2,407	2,025,785	80	—
QUARTERLY TOTAL		5,812,104	4,981	5,817,085	89	First quarter operation uptime
January 31, 2001	—	0	2,704	2,704	—	Other=well purge
February 28, 2001	—	0	2,218	2,218	—	Other=well purge
March 31, 2001	—	0	648	648	—	Other=well purge
QUARTERLY TOTAL		0	5,570	5,570	0	Second quarter operation uptime

Table A-1. (continued).

Date	Flow Totalizer Reading	Quantity of Water From Each Well (gal)			Monthly Operation Uptime (%)[a]	Comments
		TAN-29	Other	Total		
	GRAND TOTAL	55,461,049	126,847	55,587,896	98	Total Operational Uptime (from Nov. 16, 1998)

a. The operational uptime requirement for the ASTU is 80% during normal operational time periods through the first 6 months of operation. This requirement does not apply during periods of planned downtime.

Appendix B

Performance Evaluation Sample Results

January 2001 In-Situ Bioremediation Water PE Sample Results Reported from IRC

Single Blind Volatiles Mix #1, lot # 01250101

Volatile Organic Compound	Certified Value (ug/L)	Round Robin Mean (ug/L)	Reported Result (ug/L)	Duplicate Result (ug/L)	Relative Percent Difference (%)	Warning Limits (ug/L)	Action Limits (ug/L)	Result Within Warning Limits?	Duplicate Within Warning Limits?	Precision Within Limits?
vinyl chloride	0	NA	NA	NA	NA	0 - 0	0 - 0	No	No	NA
trans-1,2-dichloroethylene	11700	NA	13123	13437	2.36	8050 - 14800	6200 - 17200	Yes	Yes	NA
cis-1,2-dichloroethylene	14600	NA	18160	18446	1.56	8900 - 19900	6100 - 23200	Yes	Yes	NA
trichloroethylene	18800	NA	14986	15306	2.11	14000 - 22800	11600 - 26000	Yes	Yes	NA
1,1-dichloroethylene	0	NA	NA	NA	NA	0 - 0	0 - 0	No	No	NA
tetrachloroethylene	0	NA	NA	NA	NA	0 - 0	0 - 0	No	No	NA

Single Blind Volatiles Mix #2, lot # 01250101

Volatile Organic Compound	Certified Value (ug/L)	Round Robin Mean (ug/L)	Reported Result (ug/L)	Duplicate Result (ug/L)	Relative Percent Difference (%)	Warning Limits (ug/L)	Action Limits (ug/L)	Result Within Warning Limits?	Duplicate Within Warning Limits?	Precision Within Limits?
vinyl chloride	16.5	18.5	13.5	13.2	2.25	11.72 - 25.3	8.32 - 28.7	Yes	Yes	Yes
trans-1,2-dichloroethylene	18.6	18.9	16.0	15.7	1.89	14.45 - 23.4	12.21 - 25.6	Yes	Yes	Yes
cis-1,2-dichloroethylene	86.0	80.8	72.0	71.2	1.12	63.8 - 97.8	55.4 - 106.2	Yes	Yes	Yes
1,1-dichloroethylene	44.8	44.8	17.6	17.3	1.72	33.0 - 56.6	27.2 - 62.4	No	No	Yes
trichloroethylene	17.2	17.3	13.9	13.8	0.72	13.2 - 21.4	11.2 - 23.4	Yes	Yes	Yes
tetrachloroethylene	44.0	43.2	35.5	36.1	1.68	28.2 - 58.2	20.8 - 65.6	Yes	Yes	Yes

1. NR=Not Reported, NA=Not Analyzed
2. The standard used for Mix #1 in this round of the PE program is a custom blend; therefore, no round robin study data exist for this sample.
3. The calculated mean and standard deviation values are based on data from a round robin study conducted by Environmental Resource Associates.
4. Warning limits for Mix #1 are +/- 20% of the certified value and for Mix #2 are +/-2 standard deviations around the study mean. Corrective action is recommended for results reported outside the warning limits.
5. Action limits for Mix #1 are +/-30% of the cerified value and for Mix #2 are +/-3 standard deviations around the study mean. Corrective action is mandatory for results reported outside the action limits.
6. Precision acceptance criteria expressed as relative percent difference (RPD) is 20%.

January 2001 In-Situ Bioremediation Water PE Sample Results Reported from IRC

Single Blind Volatiles Mix #1, lot # 01250102

Volatile Organic Compound	Certified Value (ug/L)	Round Robin Mean (ug/L)	Reported Result (ug/L)	Duplicate Result (ug/L)	Relative Percent Difference (%)	Warning Limits (ug/L)	Action Limits (ug/L)	Result Within Warning Limits?	Duplicate Within Warning Limits?	Precision Within Limits?
vinyl chloride	10.0	10.1	14.6	12.4	16.3	3.25 - 16.9	0.00 - 20.4	Yes	Yes	Yes
trans-1,2-dichloroethylene	25.0	24.8	48.2	51.3	6.23	17.3 - 32.3	13.5 - 36.1	No	No	Yes
cis-1,2-dichloroethylene	98.8	97.6	168	180	6.89	65.6 - 130	49.6 - 146	No	No	Yes
1,1-dichloroethylene	27.0	26.0	18.5	18.5	0.00	15.1 - 36.9	9.62 - 42.4	Yes	Yes	Yes
trichloroethylene	10.7	9.80	16.3	16.8	3.02	7.47 - 12.1	6.30 - 13.3	No	No	Yes
tetrachloroethylene	17.7	15.8	32.3	32.7	1.23	11.6 - 20.0	9.49 - 22.1	No	No	Yes

Single Blind Volatiles Mix #2, lot # 01250102

Volatile Organic Compound	Certified Value (ug/L)	Round Robin Mean (ug/L)	Reported Result (ug/L)	Duplicate Result (ug/L)	Relative Percent Difference (%)	Warning Limits (ug/L)	Action Limits (ug/L)	Result Within Warning Limits?	Duplicate Within Warning Limits?	Precision Within Limits?
vinyl chloride	0	NA	NA	NA	NA	0 - 0	0 - 0	~~No~~	~~No~~	NA
trans-1,2-dichloroethylene	13300	NA	13123	13437	2.36	10600 - 16000	9250 - 17400	Yes	Yes	NA
cis-1,2-dichloroethylene	19000	NA	18160	18446	1.56	15200 - 22800	13300 - 24700	Yes	Yes	NA
trichloroethylene	15300	NA	14986	15306	2.11	12200 - 18400	10650 - 20000	Yes	Yes	NA
1,1-dichloroethylene	0	NA	NA	NA	NA	0 - 0	0 - 0	~~No~~	~~No~~	NA
tetrachloroethylene	0	NA	NA	NA	NA	0 - 0	0 - 0	~~No~~	~~No~~	NA

1. NR=Not Reported, NA=Not Analyzed
2. The standard used for Mix #2 in this round of the PE program is a custom blend; therefore, no round robin study data exist for this sample.
3. The calculated mean and standard deviation values are based on data from a round robin study conducted by Environmental Resource Associates.
4. Warning limits for Mix #2 are +/- 20% of the certified value and for Mix #1 are +/-2 standard deviations around the study mean. Corrective action is recommended for results reported outside the warning limits.
5. Action limits for Mix #2 are +/-30% of the cerified value and for Mix #1 are +/-3 standard deviations around the study mean. Corrective action is mandatory for results reported outside the action limits.
6. Precision acceptance criteria expressed as relative percent difference (RPD) is 20%.

February 2001 In-Situ Bioremediation Water PE Sample Results Reported from IRC

Single Blind Volatiles Mix #1, lot # 02220102

Volatile Organic Compound	Certified Value (ug/L)	Round Robin Mean (ug/L)	Reported Result (ug/L)	Duplicate Result (ug/L)	Relative Percent Difference (%)	Warning Limits (ug/L)	Action Limits (ug/L)	Result Within Warning Limits?	Duplicate Within Warning Limits?	Precision Within Limits?
vinyl chloride	25.0	22.9	20.6	20.0	2.96	14.4 - 31.4	10.2 - 35.7	Yes	Yes	Yes
trans-1,2-dichloroethylene	9.17	9.33	< 10	< 10	NA	7.05 - 11.6	5.91 - 12.8	NA	NA	NA
cis-1,2-dichloroethylene	31.7	32.6	30.6	34.4	11.69	22.7 - 42.5	17.7 - 47.5	Yes	Yes	Yes
1,1-dichloroethylene	4.05	4.30	< 10	< 10	NA	2.20 - 6.40	1.15 - 7.45	NA	NA	NA
trichloroethylene	9.70	9.63	9.6	10.3	7.04	7.01 - 12.3	5.70 - 13.6	Yes	Yes	Yes
tetrachloroethylene	13.1	12.6	16.6	18.7	11.90	8.50 - 16.7	6.45 - 18.8	Yes	No	Yes

Single Blind Volatiles Mix #2, lot # 02220102

Volatile Organic Compound	Certified Value (ug/L)	Round Robin Mean (ug/L)	Reported Result (ug/L)	Duplicate Result (ug/L)	Relative Percent Difference (%)	Warning Limits (ug/L)	Action Limits (ug/L)	Result Within Warning Limits?	Duplicate Within Warning Limits?	Precision Within Limits?
vinyl chloride	4.13	4.63	< 10	< 10	NA	2.93 - 6.33	2.08 - 7.18	NA	NA	NA
trans-1,2-dichloroethylene	4.66	4.73	< 10	< 10	NA	3.61 - 5.85	3.05 - 6.4	NA	NA	NA
cis-1,2-dichloroethylene	21.5	20.2	17.6	17.7	0.57	16.0 - 24.4	13.84 - 26.6	Yes	Yes	Yes
1,1-dichloroethylene	11.2	11.2	< 10	< 10	NA	8.26 - 14.1	6.79 - 15.6	NA	NA	NA
trichloroethylene	4.30	4.32	< 10	< 10	NA	3.30 - 5.34	2.79 - 5.85	NA	NA	NA
tetrachloroethylene	11.0	10.8	14.7	13.0	12.27	7.06 - 14.5	5.19 - 16.4	No	Yes	Yes

1. NA=Not Analyzed/Not Applicable, ND=Nondetect
2. The calculated mean and standard deviation values are based on data from a round robin study conducted by Environmental Resource Associates.
3. Warning limits are +/-2 standard deviations around the study mean.
   Corrective action is recommended for results reported outside the warning limits.
4. Action limits are +/-3 standard deviations around the study mean.
   Corrective action is mandatory for results reported outside the action limits.
5. Precision acceptance criteria expressed as relative percent difference (RPD) is 20%.

March 2001 In-Situ Bioremediation Water PE Sample Results Reported from IRC

Single Blind Volatiles Mix #1, lot # 03200101

Volatile Organic Compound	Certified Value (ug/L)	Round Robin Mean (ug/L)	Reported Result (ug/L)	Duplicate Result (ug/L)
vinyl chloride	0.00	NA	ND	ND
trans-1,2-dichloroethylene	0.00	NA	ND	ND
cis-1,2-dichloroethylene	0.00	NA	ND	ND
1,1-dichloroethylene	0.00	NA	ND	ND
trichloroethylene	0.00	NA	ND	ND
tetrachloroethylene	0.00	NA	ND	ND

Single Blind Volatiles Mix #2, lot # 03200101

Volatile Organic Compound	Certified Value (ug/L)	Round Robin Mean (ug/L)	Reported Result (ug/L)	Duplicate Result (ug/L)	Relative Percent Difference (%)	Warning Limits (ug/L)	Action Limits (ug/L)	Result Within Warning Limits?	Duplicate Within Warning Limits?	Precision Within Limits?
vinyl chloride	5.00	5.05	14.6	14.8	1.36	1.63 - 8.5	-0.08 - 10.2	No	No	Yes
trans-1,2-dichloroethylene	12.5	12.4	14.0	14.0	0.00	8.63 - 16.2	6.75 - 18.1	Yes	Yes	Yes
cis-1,2-dichloroethylene	49.4	48.8	52.7	53.4	1.32	32.8 - 64.8	24.8 - 72.8	Yes	Yes	Yes
1,1-dichloroethylene	13.5	13.0	<10	<10	NA	7.54 - 18.5	4.81 - 21.2	NA	NA	NA
trichloroethylene	5.35	4.90	<10	<10	NA	3.73 - 6.07	3.15 - 6.65	NA	NA	NA
tetrachloroethylene	8.85	7.89	12.0	11.7	2.53	5.79 - 10.0	4.74 - 11.0	No	No	Yes

1. NA=Not Analyzed/Not Applicable, ND=Nondetect
2. The calculated mean and standard deviation values are based on data from a round robin study conducted by Environmental Resource Associates.
3. Warning limits are +/-2 standard deviations around the study mean.
   Corrective action is recommended for results reported outside the warning limits.
4. Action limits are +/-3 standard deviations around the study mean.
   Corrective action is mandatory for results reported outside the action limits.
5. Precision acceptance criteria expressed as relative percent difference (RPD) is 20%.